American Nuclear Society

evaluation of subsurface radionuclide transport at commercial nuclear power plants

an American National Standard

REAFFIRMED

March 10, 2016

ANSI/ANS-2.17-2010; R2016

This standard has been reviewed and reaffirmed with the recognition that it may reference other standards and documents that may have been superseded or withdrawn. The requirements of this document will be met by using the version of the standards and documents referenced herein. It is the responsibility of the user to review each of the references and to determine whether the use of the original references or more recent versions is appropriate for the facility. Variations from the standards and documents referenced in this standard should be evaluated and documented.

This standard does not necessarily reflect recent industry initiatives for risk informed decision-making or a graded approach to quality assurance. Users should consider the use of these industry initiatives in the application of this standard.

published by the

American Nuclear Society

555 North Kensington Avenue

La Grange Park, Illinois 60526 USA

American National Standard Evaluation of Subsurface Radionuclide Transport at Commercial Nuclear Power Plants

Secretariat
American Nuclear Society

Prepared by the
American Nuclear Society
Standards Committee
Working Group ANS-2.17

Published by the
American Nuclear Society
555 North Kensington Avenue
La Grange Park, Illinois 60526 USA

Approved December 23, 2010
by the
American National Standards Institute, Inc.

American National Standard

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Comments on this standard are encouraged and should be sent to Society Headquarters.

Published by

American Nuclear Society
555 North Kensington Avenue
La Grange Park, Illinois 60526 USA

Printed in the United States of America

Foreword

(This Foreword is not a part of American National Standard "Evaluation of Subsurface Radionuclide Transport at Commercial Nuclear Power Plants," ANSI/ANS-2.17-2010.)

This standard constitutes a major revision of the original standard, ANSI/ANS-2.17-1980, which was adopted on April 9, 1980, reaffirmed on October 3, 1989, and withdrawn on July 28, 2000. A new working group, Working Group ANS-2.17 of ANS-25 Subcommittee (Siting: Environmental & Emergency Preparedness) of the American Nuclear Standards Committee, was constituted November 2005 to revise the original standard.

This standard might reference documents and other standards that have been superseded or withdrawn at the time the standard is applied. A statement has been included in the references section that provides guidance on the use of references.

This standard mentions, but does not exhaustively describe, the concepts of generating risk-informed insights, performance-based requirements, and a graded approach to quality assurance. The user is advised that one or more of these techniques could enhance the application of this standard.

Two appendices are provided to assist practitioners who would implement the guidance in this standard. Appendix A provides information on relevant U.S. Nuclear Regulatory Commission regulatory criteria and guidance, and its Table A provides a listing of standard documents (e.g., ANS, ASTM, ISO, etc.) for conducting subsurface radionuclide transport characterization, monitoring, and modeling programs. Appendix B provides tables that summarize information and parameters identified in the guidance.

The ANS-2.17 Working Group of the Standards Committee of the American Nuclear Society had the following membership:

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This standard was prepared under the guidance of Subcommittee ANS-25, Siting: Environmental & Emergency Preparedness, of the American Nuclear Society. At the time of the ballot, Subcommittee ANS-25 was composed of the following members:

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Contents

Evaluation of Subsurface Radionuclide Transport at Commercial Nuclear Power Plants

1 Scope

This national standard establishes the requirements for evaluating the occurrence and movement of radionuclides in the subsurface resulting from abnormal radionuclide releases at commercial nuclear power plants.

This standard applies to abnormal radionuclide releases that affect groundwater, water supplies derived from groundwater, and surface waters affected by subsurface transport, including exposure pathways across the groundwater–surface-water transition zone.

This standard does not apply to the following:

- subsurface occurrence and movement of nonradioactive materials, other than as indicators of subsurface radionuclide occurrence and movement in soil and groundwater;
- surface occurrence and movement of radionuclides, except to the extent that surface radionuclide occurrence and movement might affect, or be affected by, on-site subsurface radionuclide occurrence and movement (e.g., a surface release that subsequently infiltrates and affects groundwater, a subsurface release that affects surface water, including exposure pathways across the groundwater–surface-water transition zone);
- corrective action, which might be required as the result of a subsurface radionuclide release;
- dose calculations to demonstrate compliance with any regulatory requirement.

2 Definitions

2.1 Acronyms and initialisms

ALARA: as low as is reasonably achievable

ANS: American Nuclear Society

ANSI: American National Standards Institute

ASTM: ASTM International, previously known as the American Society for Testing and Materials

CFR: *Code of Federal Regulations*

CRWMS: civilian radioactive waste management system management and operating contractor

CSM: conceptual site model

DQO(s): data quality objective(s)

EIS: Environmental Impact Statement

EPRI: Electric Power Research Institute

FEP(s): feature(s), event(s), and process(es)

IAEA: International Atomic Energy Agency

NEI: Nuclear Energy Institute

NGWA: National Ground Water Association

NRC: National Research Council

REMP: Radiological Environmental Monitoring Program

RETS: Radioactive Effluent Technical Specifications

TEDE: total effective dose equivalent

USEPA: U.S. Environmental Protection Agency

USNRC: U.S. Nuclear Regulatory Commission

2.2 Definition of terms

abnormal radionuclide release: The unplanned or uncontrolled emission of an effluent (i.e., containing plant-related, licensed radioactive material).

as low as is reasonably achievable (ALARA): Every reasonable effort is made to maintain exposures to radiation as far below the dose limits as is practical consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and